***Science Process: Tools and Technology- Chromatography*** – Which Ink?

***Standard 12- Understands the nature of scientific inquiry***

***Benchmark 6- Uses appropriate tools (including computer hardware and software) and techniques to gather, analyze, and interpret sc. data.***

***Benchmark 7- Establishes relationships based on evidence and logical arguments (e.g. providing causes for effects)***

***Benchmark 8-***[***Evaluates the results of scientific investigations, experiments, observations, theoretical and mathematical models, and explanations proposed by other scientists (e.g., reviewing experimental procedures, examining evidence, identifying faulty reasoning, identifying statements that go beyond the evidence, suggesting alternative explanations)***](http://www.mcrel.org/compendium/reference.asp?item=benchmark&amp;BenchmarkID=1024&amp;subjectID=2)

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| **Level Tools & Tech** | **Expert-4** | **Practitioner- 3** | **Apprentice- 2** | **Novice- 1** |
| ***Scientific Procedures and Reasoning-*** *Benchmark 6* | Accurately and proficiently used all appropriate tools and technologies (e.g., rulers, hand lens, etc.) to gather and analyze data. | Effectively used some appropriate tools and technologies (e.g., rulers, hand lens, materials, etc.) to gather and analyze data, with only minor errors. Units of measurement included. | Attempted to use appropriate tools and technologies (e.g., ruler, hand lens, materials, etc.) to gather data (via measuring and observing) but some information was inaccurate or incomplete. | Did not use appropriate scientific tools or technologies (e.g., rulers, hand lens, materials, etc.) to gather data (via measuring and observing) |
| ***Scientific Communication- Procedures-*** *Benchmark 6* | Procedures well thought out and written. In numbered steps, start with a verb. | Thorough procedures. Missing numbered steps OR do not start with a verb. | Partial procedures. Missing numbered steps OR do not start with a verb. | Partial procedures. Missing numbered steps and do not start with a verb. |
| ***Scientific Communication-***  ***Data Tables****- Benchmark 6* | Data organized accurately in a table: variables in correct columns, sufficient number of trials, units of measurement are labeled, tables have title and labels for each column. | Data organized accurately in a table but missing one of the following: variables in correct columns, sufficient number of trials, units of measurement are labeled, tables have title and labels for each column. | Data organized accurately in a table but missing two of the following: variables in correct columns, sufficient number of trials, units of measurement are labeled, tables have title and labels for each column. | Data organized accurately in a table but missing three or more of the following: variables in correct columns, sufficient number of trials, units of measurement are labeled, tables have title and labels for each column. |
| ***Scientific Communication/Using Data- Conclusion*** *Benchmark 7* | \* Interpretation of data supported conclusions and identified all inks, and raised new questions or was applied to new contexts.  \* Disagreements with data resolved when appropriate. | Appropriately used data to support conclusions. All inks were identified, but no new questions raised. | Conclusions not supported or were only partly supported by data. Some inks were identified. | No conclusion stated, or no data recorded. Few inks were identified |
| ***Scientific Concepts and Related Content****- Benchmark 8* | \* Precisely and appropriately used scientific terminology.    \* Observable characteristics and properties of materials used went beyond the task/ investigation to make other connections or extend thinking. | \* Appropriately used scientific terminology.  \* Evidence of understanding observable characteristics and properties of objects, organisms, and/or materials used. | \* Used some relevant scientific terminology.  \* Evidence of understanding observable characteristics and properties of objects, organisms, and/or materials used | \* No use, or mostly inappropriate use, of scientific terminology.  \* Some evidence of understanding observable characteristics and properties of objects, organisms, and/or materials used. |
| **TOTAL** |  |  |  |  |